TERMS OF REFERENCE FOR
UNIT LEVEL REPRESENTATION WORKSHOP

As a guide in helping presenters describe the current state of the art in representing unit level behavior in a military environment, the following Terms of Reference (TOR) have been developed. The TOR have been divided into the following categories:

I. Simulation Requirements
II. Key Drivers
    A. Mission
    B. Unit State
    C. Physical Environment
    D. Dynamic Behavioral Response
III. Design/Architecture
IV. Other Issues

I. Simulation Requirements: The development of any effective software system is driven by the user requirements and bounded by available resources of time/technology/personnel. Please address as many of the following topics as appropriate.

1) Which M&S community (Training, Analysis, or Acquisition) does your model support?

2) Which military functions do you model (logistics, medical, combat, transportation, etc.)?

3) Who is your customer (Army, Navy, Air Force, Marine Corps, DOE, DNA, etc.)?

4) Which critical design considerations have guided your system development (e.g., repeatability, portability, maintainability, interoperability, etc.)?

II. Key Drivers: There are several key drivers which provide the contextual structure for the simulation of units in a military operation. These include representation of the effects of the following:

A. Mission: The unit tasks or goals are defined within the context of a military mission. Please address as many of the following topics as appropriate.

1) What military operations does your model represent (e.g., conventional warfare, MOUT, OOTW, non-lethal, humanitarian)?

2) How detailed is the task structure of your model? What echelon of command does your model specify on tasks?

B. Unit State: Representing the state of the unit is an important goal in simulating military operations. Relevant considerations include the effect of readiness, training, quality of leadership, maintenance, resupply, personnel, and the instantaneous and cumulative effects of low, medium, and high intensity military operations. Please address as many of the following topics as appropriate.

1) How does your model represent the unit's situational awareness -- the leader's, staff, and individual combatant's understanding of the environment and tactical situation?

2) Does your model assume the unit has perfect knowledge of the environment? For example, does your model allow the unit to get lost? Does your model allow the unit to misidentify/engage friendly units? Does your model provide the unit perfect knowledge of battle damage and casualties?

3) How does your model represent unit state in light of the considerations identified above?

4) How is communication represented in your model/ simulation?

5) What does the unit know about the enemy situation?

6) Does your model represent national, cultural, and leadership differences, and if so, how?

C. Physical Environment: Models and simulations must represent the unit and it's interaction with the physical environment with sufficient fidelity to support training, analytic, or acquisition applications. Please address as many of the following topics as appropriate.

1) What terrain resolution/features are militarily significant and can be represented in your model (e.g., 100m, 10m, surface type, cultural features and vegetation)?

2) How dynamic are these features (i.e., what kind of update rates are supported)? Does your model represent dynamic terrain (shell holes, craters, collateral damage to structures, etc.)?

3) Does your model support operations at, slower, or faster than real-time? Does it support distributed processes?

4) What theaters of operation and/or terrain specific mission aspects does your model represent (e.g., MOUT, jungle, desert)?

5) Does your model include phenomenology effects (e.g., weather, illumination, hydrology, visibility, obscurants, cloud dynamics, etc.,)?

D. Dynamic Behavioral Response: (Reactive/Proactive): These questions deal with the ability of the simulated unit to react to the environmental cues by modifying courses of action or adjusting ongoing actions (reactive response), or to interpret the physical environment and respond to perceived or anticipated conditions (proactive response). Different levels of complexity are required for each of these representations, so it may be helpful to distinguish between these two types of responses in your discussion. Please address as many of the following topics as appropriate.

1) Does your model include "reasoning" about the future at any level (e.g., modify planned actions based on such events as the loss of an adjacent unit on the flank)? How?

2) How does your model represent command and control? How does your model represent the contribution of leader behaviors? What sources of data does the unit/ leader have to determine the changing battle situation, and what kind of task/behavioral alternatives are available to respond to changes?

3) Does the "human-in-the-loop" (HITL) play a role in your model/simulation?

III. Design/Architecture: Simulations may differ in their underlying conceptual and technical architecture even when addressing similar requirements. The inherent difficulty of representing complex unit behavior has led many developers to use a human operator as a practical "stand in" where requirements go beyond the state of the art. Please address as many of the following topics as appropriate.

1) At what echelon of command does your model reflect the influence of HITL?

2) To what extent is the simulation play reflective of HITL?

3) How does your model relate individual behaviorto unit level behavior? Unit level behavior to doctrine?

4) Have you considered small group dynamics in the development of your model? Why/Why not?

5) Discuss your approach towards the aggregation/ disaggregation of units at various levels.

6) What basic approach did you take to simulating unit behavior? Why did you choose that approach? What are the strengths, weaknesses, and risks associated with your approach?

7) Discuss unit level measures of performance and how they might relate to measures of individual performance.

8) Does your model allow dynamic task reorganization? Can your model's architecture be adjusted to accommodate more sweeping structural and functional changes in the organization? New organizations? New capabilities? New technologies?

9) Does your model incorporate or take into account actions which are not performance related or do not directly contribute to the performance of the model?

10) Does your model play the OPFOR and GRAYFOR at the same level and in the same manner as it plays the BLUFOR? Does your model provide a "Dial OPFOR" capability?

IV. Other Issues. Please address as many of the following topics as appropriate.

1) What have you done to verify and validate (V&V) your model's representation of unit and appropriate individual behaviors? Can you address specific application domains for which you feel your model is most valid? Least valid?

2) What data did you have access to? Did this influence your choice of methodology, and if so, how? What data are needed to better model unit behavior that isn't already collected?

3) What are the primary issues you are currently facing in simulating unit behavior?

4) What is your experience developing individual combatant models? How has this helped/hindered your efforts on unit level representation?

5) What is your experience developing command and control models? How has this helped/hindered your efforts on unit level representation?

6) What must we add to a simulation of individuals to make it a unit simulation (structure, roles, responsibilities, communications, etc.)?

7) What are the most significant technical challenges you are currently facing with your model/simulation? What solutions did you come up with? What was the supporting rationale for that solution/methodology?

8) In what areas do you feel theoretical research needs to be conducted?

9) Are there areas where you feel important applications can be developed, given time and funding?

10) What lessons or "tricks of the trade" have been learned as a result of your efforts that could benefit other projects attempting to model unit behavior?

11) If you could start over what would you do differently? Why?

You are invited to add a discussion of any other topics you encountered as you developed your system. Your important contribution to this workshop will help the human behavior representation community assess the current state of M&S efforts in this critical area and form the basis for future technology investments to achieve OSD objectives.